Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TODD R. STEFFENS

Appeal No. 1996-3491
Application 08/213,347[1]

ON BRIEF

Before JOHN D. SMITH, HANLON and KRATZ, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal pursuant to 35 U.S.C. § 134 from the final rejection of claims 1-15, the only claims in the application.

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[1] Application for patent filed March 15, 1994.

Representative claims 1 and 9 are reproduced below:

1. A process for controlling afterburning in a fluid catalytic cracking regenerator, comprising:

providing a catalyst bed in the fluid catalytic cracking regenerator;

providing a regenerator vapor region above the catalyst bed;

injecting a first and second stream of air into the catalyst bed, wherein the first and second streams of air are spaced apart from one another;

taking a temperature measurement in the catalyst bed;

taking a temperature measurement in the regenerator vapor region;

calculating the difference between the temperature of the catalyst bed and the temperature of the vapor region of the fluid catalytic cracking regenerator as)T; and

increasing oxygen concentration in one of the first and second streams of air, when)T has an absolute value that is greater than a predetermined value, until the absolute value of)T is less than or equal to the predetermined value.

9. A process for controlling afterburning in a fluid catalytic cracking regenerator, comprising:

providing a catalyst bed in the fluid catalytic cracking regenerator;

providing a regenerator vapor region above the catalyst bed;

injecting a first and second stream of air into

the catalyst bed, wherein the first and second combustion streams are spaced apart from one another;

taking a temperature measurement in at least two separate locations within the regenerator vapor region;

calculating the difference between the temperature measurement of each location within the regenerator vapor region as)T; and

increasing oxygen concentration in one of the first and second streams of air, when)T has an absolute value that is greater than a predetermined value, until the absolute value of)T is less than or equal to the predetermined value.

Prior art references relied upon by the examiner as evidence

of obviousness are:

Pohlenz	3,206,393	Sep. 14, 1965
Luckenbach	4,243,517	Jan. 6, 1981
Cabrera et al. (Cabrera)	4,849,091	Jul. 18, 1989

Appealed claims 1-15 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Appealed claims 1-8 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Pohlenz and Luckenbach. Appealed claims 9-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Cabrera and Luckenbach.

BACKGROUND

The subject matter of the claims on appeal is directed to a process for controlling afterburning in a fluid catalytic cracking generator. Fluid catalytic cracking is a hydrocarbon cracking process in which vaporized hydrocarbon feed is cracked in the presence of microsperoidal catalyst particles (specification, page 1, lines 22-24). During the cracking process, carbonaceous material deposits on the surface of the catalyst and essentially coats it (specification, page 2, line 1) to produce a catalyst which is referred to as “coked” (specification, page 2, lines 1 and 2). Eventually, the accumulation of carbonaceous material deactivates the catalyst to the point that it becomes ineffective in enhancing the equilibrium balance of the cracking reaction under standard cracking conditions (specification, page 2, lines 4-10), and such a deactivated catalyst is then referred to as a “spent” catalyst which requires regeneration. For this purpose, the catalyst is transferred to a regeneration section of a fluid catalytic cracking unit wherein the coated coke on the catalyst is combusted by injection of air into a bed of the spent catalyst in the regenerator section. However,

unrecovered volatile hydrocarbons typically pass with the spent catalyst into the regeneration section wherein they are combusted in preference to the coke on the spent catalyst, and this results in the exhaustion of the oxygen in the air in localized areas, e.g., where the spent catalyst and volatile hydrocarbons enter the regeneration section. Because such localized areas in the dense phase catalyst bed are essentially starved of oxygen, carbon monoxide, rather than carbon dioxide, is formed by the combustion of the coke in the dense bed. The carbon monoxide thus formed in these localized areas passes from the dense catalyst bed into a dilute catalyst phase (regenerator vapor region) where it may react with oxygen in that region to cause “afterburning” with the concomitant generation of heat and substantial increase in temperature in the regenerator vapor region to such an extent that the catalyst is again deactivated. See Luckenbach at column 2, lines 2-59. Accordingly, “afterburning” produces undesirable regions of excess heat in regions of low catalyst density zones and detrimentally affects the regeneration of the catalyst and risks mechanical damage of the regenerator vessel (specification, page 2, lines 21-24).

Appellants address the afterburning problem by strategically increasing the concentration of oxygen present in the regenerator in areas in which the oxygen is starved and carbon monoxide is preferentially produced. Specifically, appellants increase the presence of oxygen in the regenerator by directly injecting oxygen into one of two air streams and thus increase the oxygen concentration in an air stream that is injected into the catalyst bed. Significantly, this increase in oxygen concentration is effected in appellants' process in response to a temperature differential that results from the excess heat produced by the "afterburning" combustion. Accordingly, appellants' claimed process recites the critical step of "increasing oxygen concentration in one of the first and second streams of air, when the)T has an absolute value that is greater than a predetermined value, until the absolute value of)T is less than or equal to the predetermined value (appealed claim 1, emphasis added)."

THE REJECTION UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

The examiner rejected claims 1-15 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to

particularly point out and distinctly claim the subject matter which applicant regards as the invention. The examiner bases this rejection on the appellants' use of the phrase "predetermined value" in independent claims 1 and 9 (examiner's answer, pages 3-4). Specifically, the examiner argues that the phrase refers to no precise value which would permit a person of ordinary skill in the art to fully understand the metes and bounds of the invention (examiner's answer, page 9).

We will not sustain this rejection. The "definiteness of the language employed must be analyzed-not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971). Appellants have provided ample guidance on pages 8-13 of their specification for determining the "predetermined value" for the temperature differential)T. We particularly note that on page 13, lines 10-12, appellants provide the precise values sought by the examiner. This is sufficient guidance to one possessing the ordinary level of skill in this art to determine the metes and bounds of the questioned claim language.

THE REJECTIONS UNDER 35 U.S.C. § 103

The examiner has rejected appealed claims 1-8 under 35 U.S.C. § 103 as being unpatentable over the combination of Pohlenz and Luckenbach and appealed claims 9-15 under 35 U.S.C.
§ 103 as being unpatentable over the combination of Cabrera and Luckenbach.

We will not sustain either of these rejections. Appellants essentially concede that prior art workers have utilized temperature differentials as an indication of the occurrence of afterburning and that the value of a temperature differential ()T) has been controlled by increasing or decreasing the total amount of oxygen or air input to a dense catalyst bed in a regenerator section. See the specification at page 4. Appellants' characterize the prior art use of a temperature differential control as involving the regulation of the rate of injection of air to increase the oxygen concentration in a regeneration zone (appeal brief, pages 9 and 10). On the other hand, the invention as claimed uses a temperature differential to increase the concentration of oxygen in a stream of air that is fed into the regeneration zone. See Figure 1 of the application wherein system controller 122 controls flow valves 123 and 124 of oxygen supply line 125 for increasing the oxygen concentration in air streams 115 and 113 prior to the introduction of the air into the regenerator section. As argued by appellants and

acknowledged by the examiner, the prior art does not disclose this feature of the claimed invention, i.e., a step in which the oxygen concentration is increased in one of the first or second streams of air. At best, the "secondary reference" to Luckenbach teaches that one can use as oxygen-containing regeneration gas either air or oxygen-enriched air (col. 4, lines 62-64). Such a teaching is not equivalent to increasing the oxygen concentration of an air stream in response to a temperature differential.

The examiner argues that a person of ordinary skill in the art would recognize that the amount of oxygen can be controlled by "one of two equivalent methods" (examiner's answer, page 10). The equivalent methods contemplated by the examiner are (1) controlling the rate of introduction of air while maintaining its concentration of oxygen constant and (2) controlling the concentration of oxygen in the air while maintaining the rate of air delivery constant. The examiner has cited no prior art, however, which discloses the control of an oxygen concentration in an air stream in response to any process parameter, much less for the purpose recited in the claimed process. Thus in the record before us, there is no

objective evidence of the method (2) itself, much less of its alleged equivalency with method (1). Absent such evidentiary support, the examiner has not established a prima facie case of obviousness for the herein claimed process. Because there is an inadequate factual basis to support a legal conclusion of obviousness, the examiner's rejections cannot be sustained.

The decision of the examiner is reversed.

REVERSED

JOHN D. SMITH Administrative Patent Judge	)
ADRIENE LEPIANE HANLON Administrative Patent Judge	) BOARD OF PATENT)) APPEALS AND)) INTERFERENCES
PETER F. KRATZ Administrative Patent Judge	)

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